Using a Remote Directory Server - RDS

This section covers the following topics:

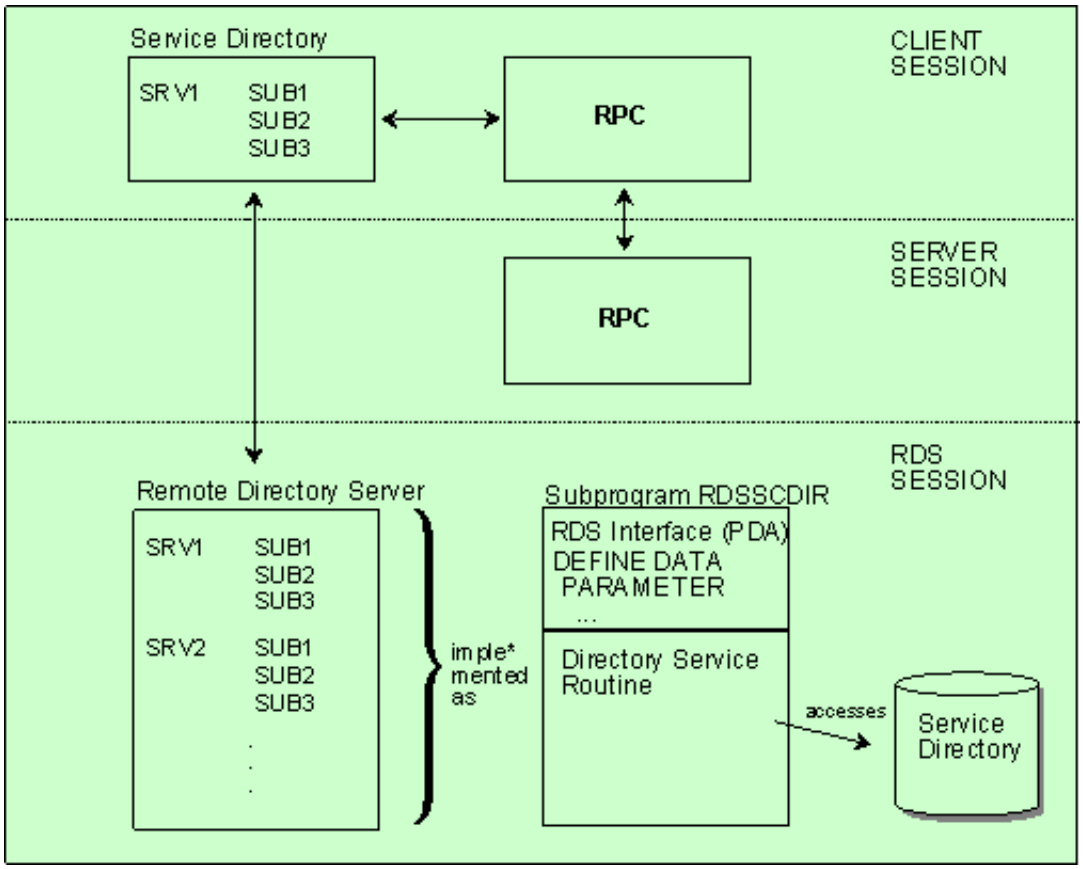
- RDS Principles of Operation
- Using a Remote Directory Server
- Creating an RDS Interface
- Creating a Remote Directory Service Routine
- Remote Directory Service Program RDSSCDIR

RDS Principles of Operation

You have two options to use a service directory:

1. **Using a service directory in a Natural subprogram.**
   Normally, to locate a service, the Natural RPC uses a service directory in a Natural subprogram. This directory is an initialized LDA data structure in program NATCLTGS generated by the SYSRPC Service Directory and has to be available to every RPC client application.
2. **Using a remote directory.**
   You can use a remote directory to locate a service. A remote directory server (RDS) enables you to define directory definitions in one place so that the RDS's services can be used by all clients in your environment.

This section describes **how to use a remote directory server to locate a service**.



The remote directory server is implemented as a Natural subprogram.

A sample of this subprogram is provided in library SYSRPC as subprogram RDSSCDIR. It reads the required directory information from a work file. The interface of this subprogram is documented, which enables you to develop your own remote directory service. For more information, see the section Creating an RDS Interface.

The RDS interface is the Natural parameter data area of the Natural subprogram and the directory service routine is the code section of the Natural subprogram. If a remote CALLNAT is not found within the client’s local service directory, the RPC runtime contacts the remote directory server by executing an internal remote CALLNAT.

An internal directory cache minimizes the access to the remote directory. The cache information is controlled by an expiration time which is defined by the remote directory server.

Using a Remote Directory Server

To use a remote directory server

1. Create a directory file for the remote directory service
2. Start the remote directory server and proceed with the following steps.
3. Define the RDS in the profile parameter RDS.
   Alternatively, you can use the SYSRPC Service Directory function under Natural RPC 5.1 or under the current version of Natural RPC. The definition of remote directory servers is still supported for reasons of compatibility. You should, however, define your RDS in the RDS subparameter of session parameter RPC. For this purpose, entries are provided that allow to define the location of the directory server. This enables you to expand existing local directory information by one or more remote directory server definitions. The example below shows how to define a remote directory server in NATCLTGS.

Service Directory					
	NODE	SERVER	LIBRARY	PROGRAM	LOGON
1	NODE1				
2		SERVER1			
3			SYSTEM		
4				TESTS1	
5				TESTS2	
6	RDSNODE				
7		DIRSRV1			
8			#ACI		
9				RDSSCDIR	

This example locally defines a server named SERVER1. This server may execute the services TESTS1 and TESTS2.

Additionally, there are definitions for the remote directory server DIRSRV1. A remote directory server is identified by a preceding "#" sign for the library definition.

The definitions of NODE and SERVER are used as usual in Natural RPC. The library definition defines the transport protocol (ACI or CSCI) which has to be used to connect the RDS. Note that CSCI only applies to OpenVMS.

For normal Natural remote procedure calls, the transport protocol is chosen depending on the node pattern settings in the Parameter Maintenance function as described in the SYSRPC Utility documentation.

Finally, the PROGRAM entry contains the name of the remote subprogram which represents the remote directory service (in this case, it refers to the sample subprogram RDSSCDIR).

Creating an RDS Interface

The RDS interface is the parameter data area (PDA) of a Natural subprogram.

To create your own RDS interface you can use the parameter data area shown below.

```
DEFINE DATA PARAMETER
    1 P_UDID(B8)                      /* OUT
    1 P_UDID_EXPIRATION(I4)           /* OUT
    1 P_CURSOR(I4)                    /* INOUT
    1 P_ENTRIES(I4)                   /* IN
    1 P_REQUEST(A16/1:250)            /* IN
    1 P_EXTENT (A16/1:250)            /* OUT
    1 P_RESULT(A32)                   /* OUT
    1 REDEFINE P_RESULT
      2 SRV_NODE(A8)
      2 SRV_NODE_EXT(A8)
      2 SRV_NAME(A8)
      2 SRV_NAME_EXT(A8)
  END-DEFINE
```

For an explanation of the parameters, refer to the table below.

Parameter	Explanation
P_UDID(B8)	Unique directory identifier, should be increased after changing the directory information. The client saves this identifier in its cache. If the binary number increases from one client request to the next, it causes the client to delete its local cache information, because it no longer corresponds to the remote directory information.
P_UDID_EXPIRATION(I4)	This defines the expiration time in seconds, that is, the number of seconds during which the client can use its local cache information without connecting the RDS to validate the UDID setting. It allows you to define a time limit after which you can be sure that your directory modifications are active for all clients. If you set this time to an unnecessarily low value, you may cause a lot of network traffic to the RDS.
P_CURSOR(I4)	The remote procedure call has the option to scan for an alternative server if a connection to the previous one cannot be established (see RPC subparameter TRYALT). This parameter contains zero for a scan from the top and may be modified by the RDS to remember the record location to continue the scan. The value will not be evaluated by the client, it will only be inserted from the cache to continue scanning.
P_ENTRIES(I4)	This parameter contains the number of service definitions in P_REQUEST.
P_REQUEST(A16/1:250)	A list of services for which a server address can be scanned. An entry is structured as program name (A8) library name (A8)
P_EXTENT (A16/1:250)	Among the server address the RDS has to supply, this is the individually extended information for the requested service, such as security and logon information (see below). For each entry in P_REQUEST, the RDS may pass the extended information to the corresponding P_EXTENT entry. The structure is: program extension (A8), library extension (A8).
SRV_NODE(A8)	Contains the server node.
SRV_NAME(A8)	Contains the server name.
SRV_NAME_EXT(A8)	Contains the server name extension.

Creating a Remote Directory Service Routine

The Remote Directory Service Routine is the code area of a Natural subprogram (the default version of this code area is subprogram RDSSCDIR in library SYSRPC).

To create your own RDS routine modify the pseudo-code documented below.

```
Set UDID and UDID_EXPIRATION values
  IF P_ENTRIES = 0
      ESCAPE ROUTINE
  IF P_CURSOR != 0
     position to next server entry after P_CURSOR
  Scan for server which may execute P_REQUEST(*)
  IF found
      FOR I = 1 to P_ENTRIES
          P_EXTENT(i) = extension of P_REQUEST(i)
      SRV_NODE        = found node name
      SRV_NODE_EXT    = node extension
      SRV_NAME        = found server name
      SRV_NAME_EXT    = server extension
      P_CURSOR        = position of found server
  ELSE
     P_CURSOR = 0
```


Remote Directory Service Program RDSSCDIR

This program is to be found in library SYSRPC. It reads the directory information from a work file (fixed-block, record length 80 byte).

Your program could also read the directory information from elsewhere (from a database, for example).

Structure of the Directory Work File

```
 * comment
   UDID definition
   UDID_EXPIRATION definition
   node definition
   ...
   node definition
```

UDID Definition

```
  (UDID)
        binary number (max. 16 digits)
```

UDID_EXPIRATION Definition

```
  (UDID_EXPIRATION)
        number of seconds (max. 10 digits)
```

Node Definition:

```
  (NODE)
       namevalue    (extension)
       server definition
        ...
       server definition
```

Server Definition

```
  (SERVER)
     namevalue (extension)
     library definition
      ...
     library definition
```

Library Definition

```
  (LIBRARY)
    namevalue (extension)
    program definition
     ...
    program definition
```


Program Definition

```
(PROGRAM)
  namevalue (extension)
   ...
  namevalue (extension)
```

Namevalue

```
Max. 8 characters in uppercase
```

The extension after *namevalue* as well as the following definition lines are optional. For an explanation of the extension definition, see the Service Directory maintenance function under Natural RPC 5.1 or under the current version of Natural RPC, as described in the SYSRPC Utility documentation.

Example Directory Read from the Work File:

```
(UDID)
      ACB8AAB4777CA000
  (UDID_EXPIRATION)
      3600
  * this is a comment
  (NODE)
  NODE1           (extension)
        (SERVER)
        SERVER1
            (LIBRARY)
            SYSTEM
                 (PROGRAM)
                 TESTS1
                 TESTS2           (extension)
                 TESTS3
        (SERVER)
        SERVER2      (extension)
              (LIBRARY)
              SYSTEM
                   (PROGRAM)
                   TESTS4
  (NODE)
  NODE2           (extension)
       (SERVER)
       SERVER1
             (LIBRARY)
             SYSTEM
                  (PROGRAM)
                  TESTS1
                  TESTS2          (extension)
                  TESTS3
                  TESTS4
```

In the above example, the directory contains:

- Two servers SERVER1 and SERVER2 running on node NODE1.
- The server SERVER1 may execute TESTS1, TESTS2 and TESTS3 in library SYSTEM.
- The server SERVER2 may execute TESTS4 on library SYSTEM.
- One server SERVER1 on node NODE2 which may execute TESTS1 - TESTS4 in library SYSTEM.

The indentation of the lines in the example above is not required. All lines may start at any position (one). You can modify this file manually.

